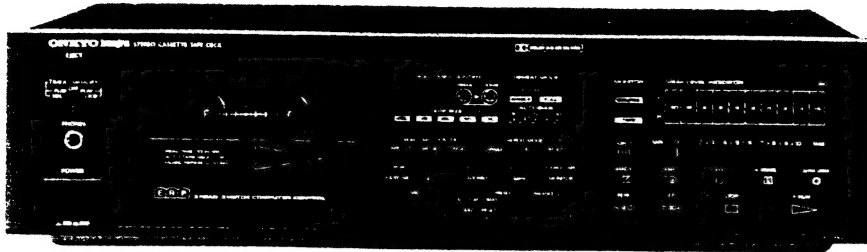


ONKYO SERVICE MANUAL

STEREO CASSETTE TAPE DECK MODEL TA-2360



Black and silver model

SAFETY-RELATED COMPONENT WARNING!!

COMPONENTS IDENTIFIED BY MARK Δ ON THE SCHEMATIC DIAGRAM AND IN THE PARTS LIST ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE THESE COMPONENTS WITH ONKYO PARTS WHOSE PART NUMBERS APPEAR AS SHOWN IN THIS MANUAL. MAKE LEAKAGE-CURRENT OR RESISTANCE MEASUREMENTS TO DETERMINE THAT EXPOSED PARTS ARE ACCEPTABLY INSULATED FROM THE SUPPLY CIRCUIT BEFORE RETURNING THE APPLIANCE TO THE CUSTOMER.

SPECIFICATIONS

Track Format:	4 tracks, 2 channels
Erasing System:	AC erase
Tape Speed:	4.8 cm/sec. (1-7/8 i.p.s.)
Wow & Flutter:	0.045% (WRMS)
Frequency Response:	20-17,000Hz (30-16,000Hz \pm 3dB) (normal position tape) 20-18,000Hz (30-17,000Hz \pm 3dB) (high position tape) 20-19,000Hz (30-18,000Hz \pm 3dB) (metal position tape)
Signal-to-Noise Ratio:	60dB (metal position tape, Dolby NR out) A noise reduction of 10dB above 5kHz and 5dB at 1kHz is possible with Dolby B NR. A noise reduction of 20dB at 5kHz is possible with Dolby C NR.
Input Jacks:	Mic jacks: 2 Input sensitivity: 0.6mV/600 ohms Input impedance 5.6 kohms Line IN: 2 Input sensitivity: 60mV Input impedance: 50 kohms
Outputs:	Line OUT: 2 Std output level: 500mV (0dB) Optimum load impedance: over 50 kohms Headphone Jack: 1

ONKYO
AUDIO COMPONENTS

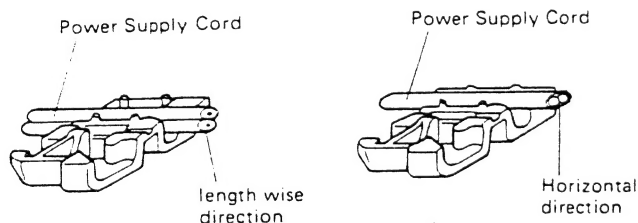
	Optimum load impedance: 8-200 ohms
Motors:	DC servo motor: 1 DC motor: 2
Heads:	REC/PB heads: Special Hard Permalloy Erase head: Ferrite
Power Supply:	AC 220V/50Hz
Power Consumption:	34 watts
Dimensions:	435(W) × 112(H) × 360 (D)mm (17-1/8" × 4-3/8" × 14-1/8")
Weight:	6.1 kg. (13.4 lbs.)

Specifications and external appearance are subject to change without notice because of product improvements.

SERVICE PROCEDURES

1. Replacement of power supply cord

There are two power supply cord outlets on the strainrelief. Insert them in prescribed direction to ensure safety. AS-UC-3 (UD<120V> model) should be inserted lengthwise and other types of cords should be inserted horizontally.



2. Instruction resistance measurement

Connect the insulating-resistance tester between the plug of power supply cord and chassis.

Specifications: 500V more than 10MΩ

3. Replacing the lamps

This unit used the lamps listed below.

Circuit No.	Parts No.	Description
Mechanism 184b	24606173	50mA, 14V. Lamp
PL901	210090	150mA, 14V. Lamp
PL902	210190	60mA, 14V. Lamp

CAUTION: Before replacing the lamps, be sure to unplug the power supply cable.

FEATURES

Three Heads with Special Hard Permalloy For Superior Metal Tape Performance

Having three heads means you can monitor the actual recorded signal as you record instead of rewinding the tape to check your recording afterward. The 3-head system also

has the advantage of making possible the use of separate record and playback gaps, each optimized for its own task. The special hard permalloy head formulation boasts the high saturation flux density and abrasion resistance needed for true metal tape compatibility.

Preset Automatic Accubias

Different brands of cassette tape can exhibit slight variations in playback frequency response even when recorded at exactly the same bias level. Automatic Accubias tailors the recording bias to the magnetic characteristics of any cassette tape. The Auto Accubias preset knob allows you to choose from five different frequency response positions (-2, -1, 0, +1, +2) before the adjustment takes place. The 0 setting results in flat playback response. If you wish to boost high frequencies (when recording electronic music, for example) choose +1 or +2; choose -1 or -2 to attenuate them. This system combines maximum flexibility with ease of operation.

Dual Sensor Real Time Tape Counter

The tape counter circuit measures the speed of both tape reels and compares them by microcomputer to provide precise readings of remaining time. This dual sensor technique eliminates small errors in time calculations caused by slight variations in tape thickness between different manufacturers to give the most accurate time indications possible.

2-Motor Tape Transport with Separate Head Assembly Motor

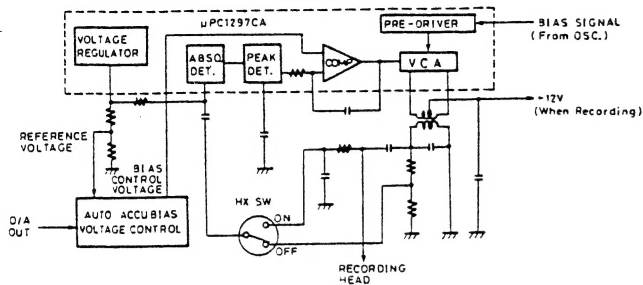
The tape transport system, along with the heads, is the most important factor affecting the basic performance of a cassette deck. To assure extremely stable and accurate transport, this unit uses a DC servo-controlled capstan motor. This motor is unaffected by fluctuations in the power supply voltage and frequency and instantaneous changes in load. A highly reliable simple drive transmission system and precision vertical cassette holder further enhance overall accuracy and stability. As a result, wow and flutter is under 0.045%. In addition, separate DC motors drive the reel tables and head base and the head assembly is constructed to move silently with no annoying clicks.

Dolby B and C Noise Reduction, and Dolby HX PRO

Along with standard Dolby B NR, this unit also has the even more effective Dolby C NR system. Dolby C NR reduces tape background noise by 20dB at 5kHz, about 3 times more than Dolby B NR. In addition to its wide band noise reduction, Dolby C NR uses a sliding band technique that varies the band width of noise reduction according to the input level, thereby avoiding noise "pumping." Dolby C NR also has an anti-saturation effect to reduce the chance of tape saturation in the high range. All these features combine to eliminate the adverse effects on tape sound that other noise reduction systems can cause. This deck also features Dolby HX PRO which helps prevent tape saturation and thereby allows you to record tapes containing a wider dynamic range.

CIRCUIT DESCRIPTIONS

1. DOLBY HX PRO CIRCUIT



In this circuit, the bias oscillates only when recording. The size of the bias current is controlled by the bias control voltage. When the HX PRO is OFF, by means of the recording signal, a non-modulating oscillator voltage is applied to the absolute value detection circuit. When the HX PRO is ON, by means of the recording signal coming from the recording head, a modulating oscillator voltage is applied to the absolute value detection circuit, and by means of the recording signal level peak detection value, the bias current is instantaneously controlled. At such time, by means of the CR integrated circuit, the frequency characteristic is maintained. (Approx. 8KHz)

2. PRESET ACCU BIAS OPERATION

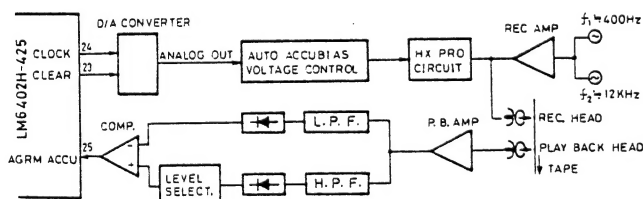


Fig. 1 Block diagram

With the LEVEL SELECT, the 12KHz level is set in 5 stages. With regard to 400Hz, the 12KHz level is set in 5 stages.

When the ACCU BIAS operation is started, a 400Hz/12kHz mixed signal is recorded, the bias current in this case being controlled by a signal from the microcomputer. The playback signal is separated by filter into the original 400Hz and 12kHz signals, and after being rectified these signals are passed to a comparator where a comparison check is made to see if one of the signals is greater than the other. A HIGH comparator output indicates that the 12kHz signal is greater than the 400Hz signal, and a LOW output indicates that the 400Hz is lower than the 12kHz.

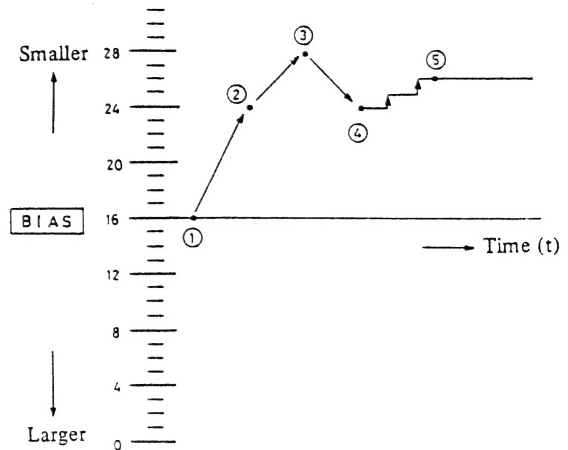


Fig. 2 Bias adjustment method

First the bias is set to step 16 which is in the center of the bias range shown in Figure 2. Then the 400Hz/12kHz mixed signal is subjected to a comparison operation to see which component is larger. If the 12kHz signal is larger, then the bias level is too small. If the 400Hz signal is larger, on the other hand, the bias level is too large. In the example shown in Figure 2, the bias level at step 16 is too large, so the bias is reduced by $\frac{1}{4}$ of the total range (8 steps) to position (2) where the 400Hz and 12kHz components are again compared. If the 400Hz signal is still larger than the 12kHz signal, the bias level is further reduced by $\frac{1}{4}$ of the total (4 steps) (3) and the components then compared again. This procedure is used for rough adjustment of the optimum bias. If at this stage, the 12kHz signal is now found to be greater than the 400Hz signal, the optimum bias is known to exist between steps 24 and 28. The operation is now switched to fine adjustment — the bias is increased by $\frac{1}{4}$ and then reduced one step at a time from step 24. The step where the component signal size relationship is switched from $400 > 12k$ to $12k > 400$ is taken as the optimum bias (5), and the bias is set at this level. This fine adjustment operation proceeds only from greater to lower bias levels in order to avoid misoperation due to possible drop outs. The effects of a drop out on the bias adjustment when the bias is changed from a smaller to a larger level is indicated in Figure 3, while the reverse case is indicated in Figure 4.

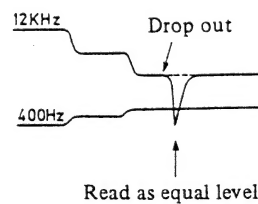


Fig. 3 Example of misoperation caused by drop out

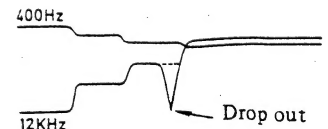


Fig. 4 Example where effect of drop out is avoided

3. DA Converter and Data Setting Method

The D/A converter circuitry is outlined in Figure 5, and the logic diagram of the 4024BP 7-stage binary counter in Figure 6. The 4024BP counter is counted up each time a negative input pulse is applied to the clock pin, the output data being obtained from Q1 thru Q7 (although only Q1 thru Q5 are actually used). This output is converted to an analog quantity when passed through the R-2R ladder resistance circuit.

If the power supply voltage is 5V, the voltage per step is approximately 0.156V with a total of about 4.84V. Since this 4024BP is only involved in up counting, setting to a value lower than the current value (that is, greater bias) results in an initial clearing and output of pulses until the set value is reached.

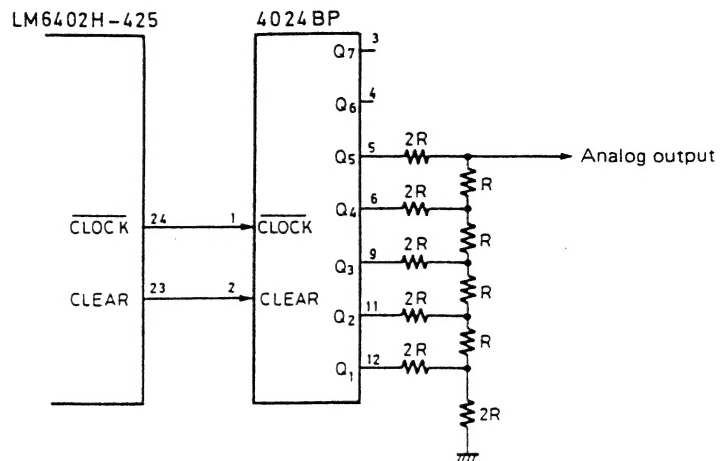


Fig. 5 DA converter circuitry

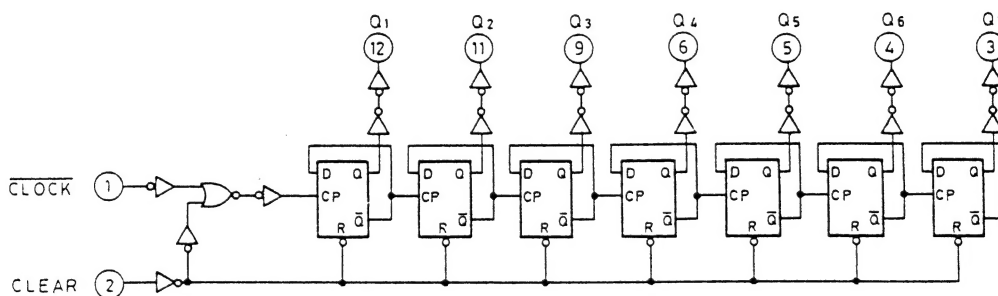


Fig. 6 4024BP logic circuit

4. Input Port Expander IC

The equivalent circuit of the LC7800 used to expand input ports is shown in Figure 7. This IC includes four 4-bit input ports, one 4-bit output port, and one 4-bit selector input port. When BA of the selector input is set to LOW and the other bits to HIGH, the A0" A1" A2" A3 input port is connected to the D0" D1" D2" D3 output port. And if only the BB bit is set to LOW, the B0" B1" B2" B3 input is selected. Hence, a LOW level signal is applied to the selector port bits in cyclic order, and the operation indicator LEDs are switched on and off dynamically in combination with the #13, #14, and #15 LED output ports while input port data is being read out.

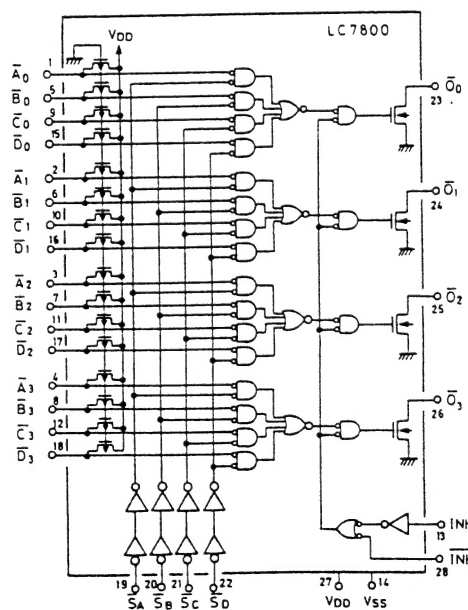
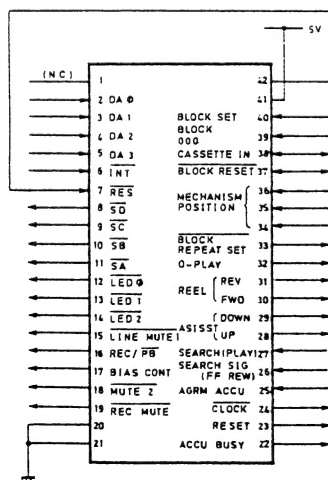


Fig. 7 LC7800 equivalent circuit

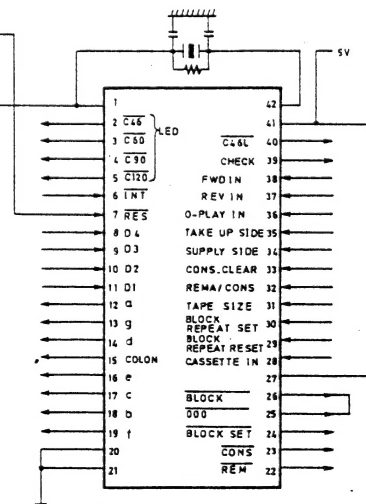
MICROCOMPUTER(LM6402H-425)

Pin no.	Name	Function	Classification
2~5	DA0~DA3	Reading of data from the inport port expander IC	IN
6	$\overline{\text{INT}}$	Rotation signal input (for auto-stop operation)	IN
8~11	$\overline{\text{SA}} \sim \overline{\text{SD}}$	Input port expander IC and dynamic LED selector IC	OUT
12~14	$\overline{\text{LED0}} \sim \overline{\text{LED3}}$	Operation display dynamic LED data output	OUT
15	LINE MUTE 1	Line muting output signal generated when the power is switched on, and during ACCU BIAS operation.	OUT
16	REC/PB	Output signal for muting DIN outputs when recording	OUT
17	BIAS CONT.	Output signal for control of bias oscillator	OUT
18	$\overline{\text{MUTE2}}$	Signal for switching muting off during playback	OUT
19	$\overline{\text{REC. MUTE}}$	Signal for muting the recording amplifier output	OUT
22	ACCU BUSY	Output signal generated during ACCU BIAS operation	OUT
23			OUT
24			OUT
25			OUT
26	SEARCH SIG (HIGH)	Input signal from high-speed travel tune-selector.	IN
27	SEARCH SIG (LOW)	Input signal from low-speed travel tune-selector amplifier	IN
28	UP	Output signal for driving the assist motor towards the PLAY position.	OUT
29	DOWN	Output signal for driving the assist motor towards the FF/REW position.	OUT
30	FWD	Output signal for driving the reel motor towards the FF position.	OUT
31	REW	Output signal for driving the reel motor towards the REV position.	OUT
32	O-PLAY	Reel motor torque switching output	OUT
33	$\overline{\text{BLOCK SET}}$	Output which informs the counter IC that the BLOCK SET key has been pressed.	OUT
34~36	a.b.c	Input ports for signal from the mechanism position switches	IN
37	BLOCK RESET	Output which informs the counter IC that the BLOCK RESET key, or any other key apart from the BLOCK SET key has been pressed.	OUT
38	CASSETTE IN	Input involved in detection of cassette half, and output which stops the capstan motor when an abnormal mechanism status is detected.	I/O
39	$\overline{\text{BLOCK MATCHING \& 000 INPUT}}$	Input of 000 input signal and BLOCK matching signal from the counter IC.	IN
40	$\overline{\text{BLOCK SET}}$	Input which accepts signals from the counter IC during BLOCK SET.	IN

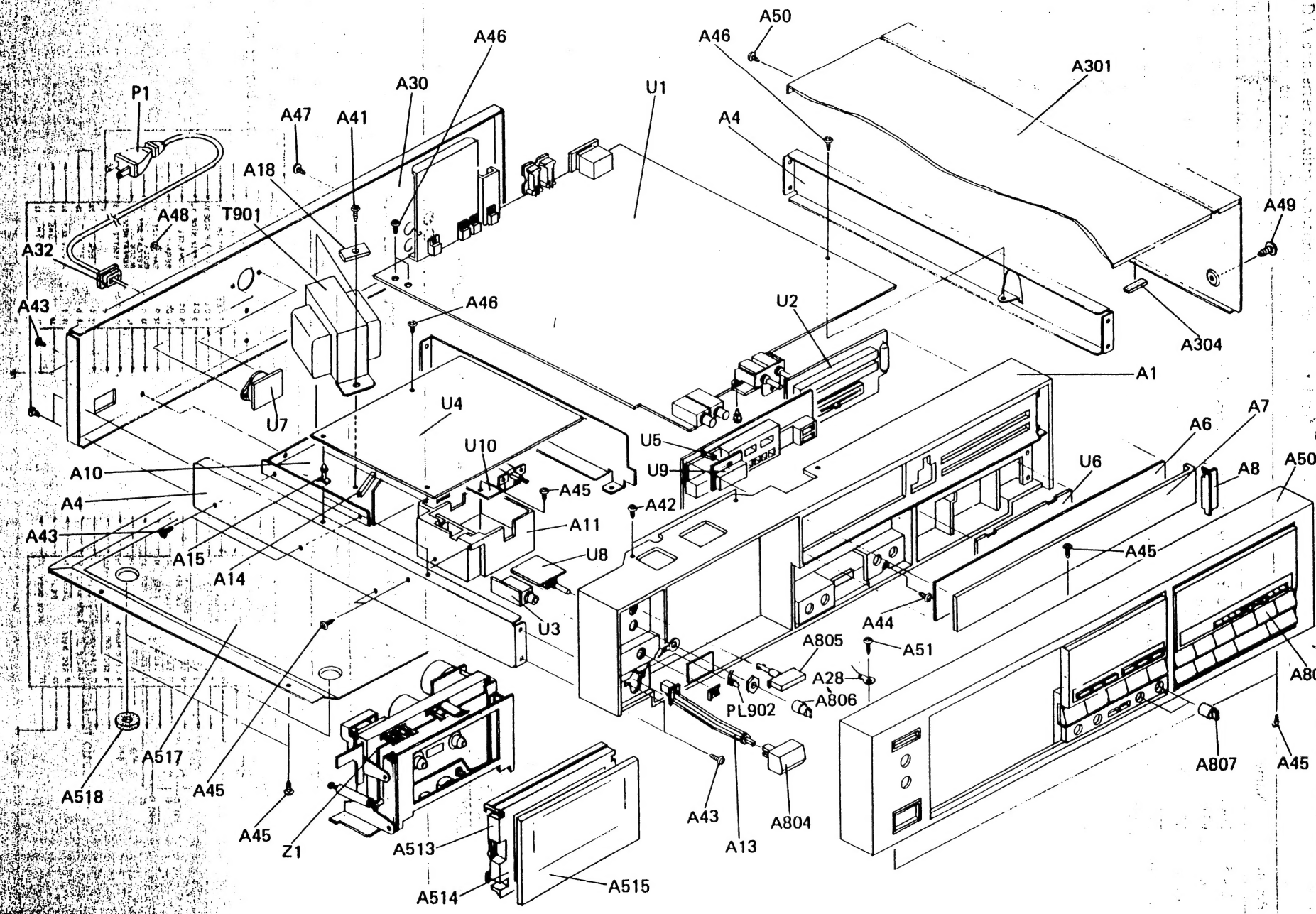
Q701 LM6402H-425



Q702 LM6402H-424



CHASSIS EXPLODED VIEW



DA Converter and Data Setting Method
 (C) 1980 SAMSUNG ELECTRONICS CO., LTD.

CHASSIS EXPLODED VIEW PART LIST

REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
A1	27110282A	Front bracket	A518	27175011C	Leg
A4	27115205	Side bracket	A801	28322530A	Knob ass'y (S)
A6	28133156A	Back plate		28322531A	Knob ass'y (B)
A7	28130236A	Dial plate	A804	28321904A	Knob (POW) ass'y (S)
A8	27190446	Holder		28321905	Knob (POW) ass'y (B)
A10	27130331H	Bracket (PT)	A805	28321027B	Knob (EJ) ass'y (S)
A11	27190351-1	Holder (POW)		28321988	Knob (EJ) ass'y (B)
A13	27273030C	Joint (L)	A806	28320797	Knob (SEL) (S)
A14	28170014	Bushing		28321735	Knob (SEL) (B)
A15	27190009	Holder	A807	28322437	Knob (LEV)
A18	870065	Special washer	T901	Δ 230820	NPT-845G, Power transformer
A19	86414010	FWN4×10FN, Flange nut	P1	Δ 253128A	AS-CEE, Power supply card
A28	223004-1	Terminal	PL902	210190	14V 60mA, Lamp
A30	27120849	Back bracket	Z1	244091	NDM-83, Tapa mechanism ass'y
A32	27300750	Strainrelief	U1	15078534-1A	NAAF-2634-1A
A41	830440109	4TTC+10C (BC), Screw		15078535-1	Main pc board ass'y
A42	834426068	2. 6TTS+6B (BC), Screw			NAVR-2635-1
A43	834430068	3TTS+6B (BC), Screw	U2		Peak meter, Volume pc board ass'y
A44	82143006	3P+6FN (BC), Screw		15078536-1	NAHP-2636-1
A45	833430080	3TTP+8P (BC), Screw			Head phone pc board ass'y
A46	831430088	3TTW+8B (BC), Screw	U3		NACOC-2637-1
A47	834430108	3TTW+10B (BC), Screw		15078537-1	Control pc board ass'y
A48	82142604	2. 6P+4F (BC), Screw	U4		NADIS-2638-1
A49	838440089	4TTB+8C (BC), Screw		15078538-1	Display pc board ass'y
A50	838430088	3TTB+8B (BC), Screw	U5		NASW-2639-1
A51	834230108	3TTS+10B (NI), Screw		15078539-1	Operation switch pc board ass'y
A301	28184235	Top cover (S)	U6		NARM-2640-1
	28184236	Top cover (B)		15078540-1	Remote control pc board ass'y
A304	28140408	Cushion	U7		NASW-2641-1
A501	15072121	Front panel ass'y (S)		15078541-1	Timer switch pc board ass'y
	15062121	Front panel ass'y (B)	U8		NALED-2642-1
A501a	28125133	End cap (L) (S)	U9		Display pc board ass'y
	28125135A	End cap (L) (B)		15078542-1	NAPS-2664-1
A501b	28125134	End cap (R) (S)	U10	Δ 15078564-1	Power switch pc board ass'y
	28125136A	End cap (R) (B)			
A501c	27267238A	Guide (EJ) (S)			
	27267239A	Guide (EJ) (B)			
A501d	27267206B	Guide (POW) (S)			
	27267235B	Guide (POW) (B)			
A501e	28198577	Facet (POW)			
A501f	28191349A	Clear plate			
A501g	2726403	Plate			
A513	27300697	Cassette lid			
A514	27262332	Plate			
A515	28191350	Window			
A517	27170225A	Bottom board			

NOTE: THE COMPONENTS IDENTIFIED BY MARK ARE CRITICAL FOR RISK OF FIRE AND ELECTRIC SHOCK. REPLACE ONLY WITH PARTS NUMBER SPECIFIED.

NOTE: (S): Only Silver model
(B): Only Black model

ADJUSTMENT PROCEDURES TEL 279A 14M21M40DEM 89AT

TAPE MECHANISM-PARTS LIST

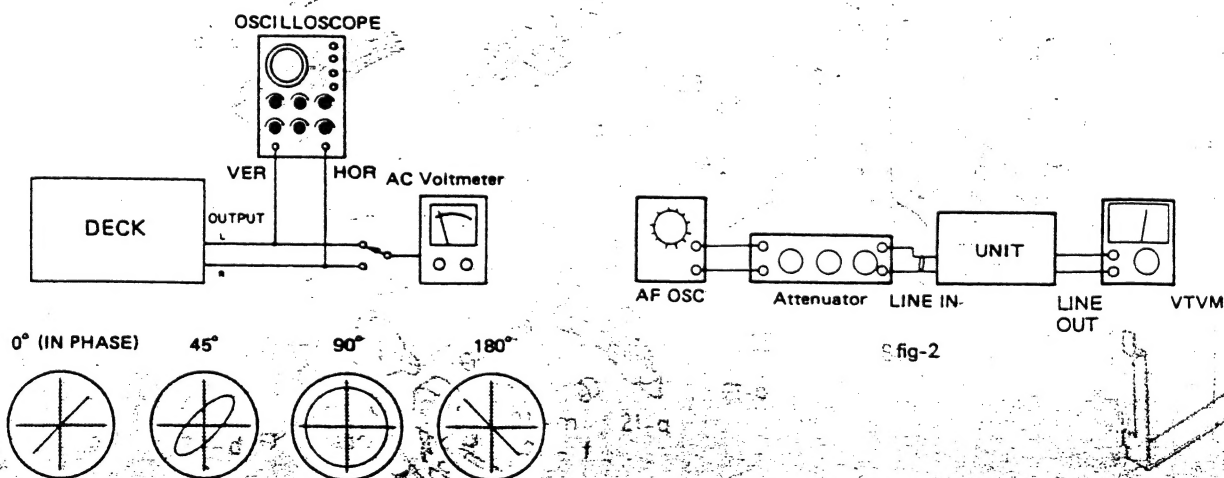
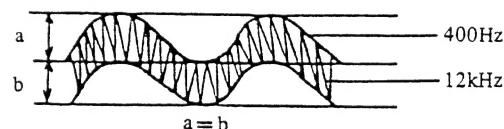
REF. NO.	PART NO.	DESCRIPTION	REF. NO.	PART NO.	DESCRIPTION
1	24611042	Chassis	94	24601145	Reel motor ass'y
2	24605468	Spring	94a	24601054	Reel motor
11	24611043	Brake plate ass'y	94b	24605467	Spring
11a	24611053	Brake plate	94c	24602235A	Lever ass'y, wheel
11b	24610999	Brake rubber	94d	24602236A	Wheel
11c	24605500	Spring	94e	24610969	1.3x3.4x0.5mm, Washer
13	24606204	Sensor pc board ass'y	94f	24610970	Felt
21a	24611045	Head base	94g	24602237A	Wheel, motor
21b	24611046	Head block	94h	24610981	1.7x4x0.25mm, Washer
21c	24605502	Spring	94i	24610374	Washer
21d	82512012	2x12mm, Binding screw	94j	24611048	Holder, spring
21e	801250	2x4mm, Pan head screw	95	352942206	22μF, 16V, Elect. capacitor
21f	24600037A	Rec/pb. head	105	24602372	Flywheel
21g	24600041	Erase head	107	24605452	Spring, thrust
21h	24605618	Spring	110	24602269	Flat belt
21i	24611052	Binder	112	24610673	Flat washer
21j	24611054	Stopper	115a	24610971	Plate, flywheel
21k	24611055	Washer	115b	24610671	Holder, thrust
21l	82112002	2x2mm, Pan head screw	115d	24601202	Motor ass'y, capstan
21m	801251	Screw	115g	801338	Pan head screw with washer
21n	24610652	Shaft	121	24602270	Arm, pinch roller
21o	24610495	Adjustment nut	123	24605453	Spring
21p		Connector ass'y	125	833125069	2.5x8mm, Pan head screw
21q		Connector ass'y	126	833125059	2.5x5mm, Pan head screw
21r		Connector ass'y	129	801250	2x4mm, Pan head screw
21t	24604062	Spacer	131	82512614	2.6x14mm, Binding screw
22	893030	E3, Circlip	133	833426105	2.6x10mm, Tapping screw
46	24610943	φ3mm, Steelball	134	833126055	2.6x5mm, Tapping screw
47	24610963	Plate, head holding	136	837120058	2x5, Truss screw
53	24610964	Spring holder	137	801292	2x3mm, Truss screw
54	24605501	Spring	139	24610349	1.8x3.2x0.5mm, Washer
55	24605505	Spring	140	24610515	2.6x4.7x0.25mm, Washer
56	24602267	Reel stand ass'y	141	24610972	2.6x4.7x0.13mm, Washer
63a	24611056	Plate, switch holding	142	24610973	2.7x6x0.5mm, Washer
63b	24606205	Leafswitch	150	24605481	Spring
63c	24611057	Washer	151	24611018	Panel ass'y
63d	82112030	2x30mm, Pan head screw	152	24602271	Belt
63e		Connector ass'y	155	26411079	Break
63f	24611058	Washer	156	833130049	Pan head screw
70	24603281	Lever, switch	158	24610939	Plate, right side
71	24603282	Lever, switch, metal	164	24605188	Spring, cassette
72	24611049	Plate, lock	168	24610940	Holder ass'y
73	24605503	Spring	168a	24610949	Plate, holder
74	891030	CS3, Circlip	168b	24610849	Holder, right
76	24601167	Pulley ass'y	168c	24610848	Holder, left
77	24611047	2.1x4.5x0.1, Washer	168d	24605463	Spring, cassette
78	24611003	1.8x3.8x0.5, Washer	168e	835426082	2.6x8mm, Flat head screw
80	24601212	PAD unit ass'y	172a	24611059	Plate, left
80a	24610968	Plate	172b	24603283	Lever, cancel
80b	24601103	Motor PAD	172c	24605504	Spring
80c	24606182	Leafswitch	172d	893030	E3, Circlip
80d	24602133	Cam gear	172e	24610452	Flat washer
80e	82112003	2x3mm, Pan head screw	179	24611051	Damper unit
80f	833125209	2.5x20mm, Pan head screw	180	24605456	Spring
80g	24606181	Pc board	181	891024	CS2.4, Circlip
80h	25055106	Post with base	184	24606168	Holder ass'y, lamp
80i	352942206	22μF, 16V, Elect. capacitor	184a	24610498	Holder, lamp
90	24611052	Binder	184b	24606173	14V, 50mA, Lamp
91	24611053	Brake plate	184c	24606173	14V, 50mA, Lamp
92	24611054	Stopper	184d	24606173	14V, 50mA, Lamp
93	24611055	Washer	184e	24606173	14V, 50mA, Lamp
94	24611056	Plate, switch holding	184f	24606173	14V, 50mA, Lamp
95	24611057	Washer	184g	24606173	14V, 50mA, Lamp
96	24611058	Washer	184h	24606173	14V, 50mA, Lamp
97	24611059	Washer	184i	24606173	14V, 50mA, Lamp
98	24611060	Washer	184j	24606173	14V, 50mA, Lamp
99	24611061	Washer	184k	24606173	14V, 50mA, Lamp
100	24611062	Washer	184l	24606173	14V, 50mA, Lamp
101	24611063	Washer	184m	24606173	14V, 50mA, Lamp
102	24611064	Washer	184n	24606173	14V, 50mA, Lamp
103	24611065	Washer	184o	24606173	14V, 50mA, Lamp
104	24611066	Washer	184p	24606173	14V, 50mA, Lamp
105	24611067	Washer	184q	24606173	14V, 50mA, Lamp
106	24611068	Washer	184r	24606173	14V, 50mA, Lamp
107	24611069	Washer	184s	24606173	14V, 50mA, Lamp
108	24611070	Washer	184t	24606173	14V, 50mA, Lamp
109	24611071	Washer	184u	24606173	14V, 50mA, Lamp
110	24611072	Washer	184v	24606173	14V, 50mA, Lamp
111	24611073	Washer	184w	24606173	14V, 50mA, Lamp
112	24611074	Washer	184x	24606173	14V, 50mA, Lamp
113	24611075	Washer	184y	24606173	14V, 50mA, Lamp
114	24611076	Washer	184z	24606173	14V, 50mA, Lamp
115	24611077	Washer	185	24606173	14V, 50mA, Lamp
116	24611078	Washer	186	24606173	14V, 50mA, Lamp
117	24611079	Washer	187	24606173	14V, 50mA, Lamp
118	24611080	Washer	188	24606173	14V, 50mA, Lamp
119	24611081	Washer	189	24606173	14V, 50mA, Lamp
120	24611082	Washer	190	24606173	14V, 50mA, Lamp
121	24611083	Washer	191	24606173	14V, 50mA, Lamp
122	24611084	Washer	192	24606173	14V, 50mA, Lamp
123	24611085	Washer	193	24606173	14V, 50mA, Lamp
124	24611086	Washer	194	24606173	14V, 50mA, Lamp
125	24611087	Washer	195	24606173	14V, 50mA, Lamp
126	24611088	Washer	196	24606173	14V, 50mA, Lamp
127	24611089	Washer	197	24606173	14V, 50mA, Lamp
128	24611090	Washer	198	24606173	14V, 50mA, Lamp
129	24611091	Washer	199	24606173	14V, 50mA, Lamp
130	24611092	Washer	200	24606173	14V, 50mA, Lamp
131	24611093	Washer	201	24606173	14V, 50mA, Lamp
132	24611094	Washer	202	24606173	14V, 50mA, Lamp
133	24611095	Washer	203	24606173	14V, 50mA, Lamp
134	24611096	Washer	204	24606173	14V, 50mA, Lamp
135	24611097	Washer	205	24606173	14V, 50mA, Lamp
136	24611098	Washer	206	24606173	14V, 50mA, Lamp
137	24611099	Washer	207	24606173	14V, 50mA, Lamp
138	24611100	Washer	208	24606173	14V, 50mA, Lamp
139	24611101	Washer	209	24606173	14V, 50mA, Lamp
140	24611102	Washer	210	24606173	14V, 50mA, Lamp
141	24611103	Washer	211	24606173	14V, 50mA, Lamp
142	24611104	Washer	212	24606173	14V, 50mA, Lamp
143	24611105	Washer	213	24606173	14V, 50mA, Lamp
144	24611106	Washer	214	24606173	14V, 50mA, Lamp
145	24611107	Washer	215	24606173	14V, 50mA, Lamp
146	24611108	Washer	216	24606173	14V, 50mA, Lamp
147	24611109	Washer	217	24606173	14V, 50mA, Lamp
148	24611110	Washer	218	24606173	14V, 50mA, Lamp
149	24611111	Washer	219	24606173	14V, 50mA, Lamp
150	24611112	Washer	220	24606173	14V, 50mA, Lamp
151	24611113	Washer	221	24606173	14V, 50mA, Lamp
152	24611114	Washer	222	24606173	14V, 50mA, Lamp
153	24611115	Washer	223	24606173	14V, 50mA, Lamp
154	24611116	Washer	224	24606173	14V, 50mA, Lamp
155	24611117	Washer	225	24606173	14V, 50mA, Lamp
156	24611118	Washer	226	24606173	14V, 50mA, Lamp
157	24611119	Washer	227	24606173	14V, 50mA, Lamp
158	24611120	Washer	228	24606173	14V, 50mA, Lamp
159	24611121	Washer	229	24606173	14V, 50mA, Lamp
160	24611122	Washer	230	24606173	14V, 50mA, Lamp
161	24611123	Washer	231	24606173	14V, 50mA, Lamp
162	24611124	Washer	232	24606173	14V, 50mA, Lamp
163	24611125	Washer	233	24606173	14V, 50mA, Lamp
164	24611126	Washer	234	24606173	14V, 50mA, Lamp
165	24611127	Washer	235	24606173	14V, 50mA, Lamp
166	24611128	Washer	236	24606173	14V, 50mA, Lamp
167	24611129	Washer	237	24606173	14V, 50mA, Lamp
168	24611130	Washer	238	24606173	14V, 50mA, Lamp
169	24611131	Washer	239	24606173	14V, 50mA, Lamp
170	24611132	Washer	240	24606173	14V, 50mA, Lamp
171	24611133	Washer	241	24606173	14V, 50mA, Lamp
172	24611134	Washer	242	24606173	14V, 50mA, Lamp
173	24611135	Washer	243	24606173	14V, 50mA, Lamp
174	24611136	Washer	244	24606173	14V, 50mA, Lamp
175	24611137	Washer	245	24606173	14V, 50mA, Lamp
176	24611138	Washer	246	24606173	14V, 50mA, Lamp
177	24611139	Washer	247	24606173	14V, 50mA, Lamp
178	24611140	Washer	248	24606173	14V, 50mA, Lamp
179	24611141	Washer	249	24606173	14V, 50mA, Lamp
180	24611142	Washer	250	24606173	14V, 50mA, Lamp
181	24611143	Washer	251	24606173	14V, 50mA, Lamp
182	24611144	Washer	252	24606173	14V, 50mA, Lamp
183	24611145	Washer	253	24606173	14V, 50mA, Lamp
184	24611146	Washer	254	24606173	14V, 50mA, Lamp
185	24611147	Washer	255	24606173	14V, 50mA, Lamp
186	24611148	Washer	256	24606173	14V, 50mA, Lamp
187	24611149	Washer	257	24606173	14V, 50mA, Lamp
188	24611150	Washer	258	24606173	14V, 50mA, Lamp
189	24611151	Washer	259	24606173	14V, 50mA, Lamp
190	24611152	Washer	260	24606173	14V, 50mA, Lamp
191	24611153	Washer	261	24606173	14V, 50mA, Lamp
192	24611154	Washer	262	24606173	14V, 50mA, Lamp
193	24611155	Washer	263	24606173	14V, 50mA, Lamp
194	24611156	Washer	264	24606173	14V, 50mA, Lamp
195	24611157	Washer	265	24606173	14V, 50mA, Lamp
196	24611158	Washer	266	24606173	14V, 50mA, Lamp
197	24611159	Washer	267	24606173	14V, 50mA, Lamp
198	24611160	Washer	268	24606173	14V, 50mA, Lamp
199	24611161	Washer	269	24606173	14V, 50mA, Lamp
200	24611162	Washer	270	24606173	14V, 50mA, Lamp

TAPE MECHANISM-EXPLODED VIEW ADJUSTMENT PROCEDURES

Item		Connection of instrument	Line input	Test tape	Mode	Output indicator	Adjustment point	Adjust	Remarks
1	Tape speed	Frequency counter to LINE output terminal		MTT-111	PB	Frequency counter	Semi-fixed on the motor	3,010 to 3,020Hz	
2	Head azimuth	AC voltmeter and oscilloscope to LINE output terminal		VTT-658	PB	AC voltmeter	Head azimuth screw	Maximum and same phase at channels L and R	Fig. 1
3	Playback level	AC voltmeter to terminals TP-1 and TP-2		MTT-150	PB	AC voltmeter	R-123 (Ch.L) R-124 (Ch.R)	300mV	
4	Bias current	Fig. 2	1kHz, -20dB and 12kHz, -20dB	NEW XL-II90	REC/PB	AC voltmeter	R-569 (Ch.L) R-570 (Ch.R)	Same level at REC/PB	Input VR maximum
5	Record level	Fig. 2	1KHz		REC PAUSE	AC voltmeter	Attenuator or AF OSC output	350mV	accu VR center position
					REC/PB	AC voltmeter	R-401 (Ch.L) R-402 (Ch.R)	Same level at REC/PB	

ACCUBIAS oscillator adjustment

1. Connect the oscilloscope and AC voltmeter to the terminal TP-3.
2. Pull P605 socket out of P605 plug on NACOC-2673.
3. Connect +5V terminal to the cathode of D-618 with short-clip.
4. Adjust the semi-fixed resistor R-531 so that the 400Hz and 12kHz mixing signals become same level ($a=b$) as shown below.
5. Adjust R-532 so that the AC voltmeter indicator becomes 20mV.



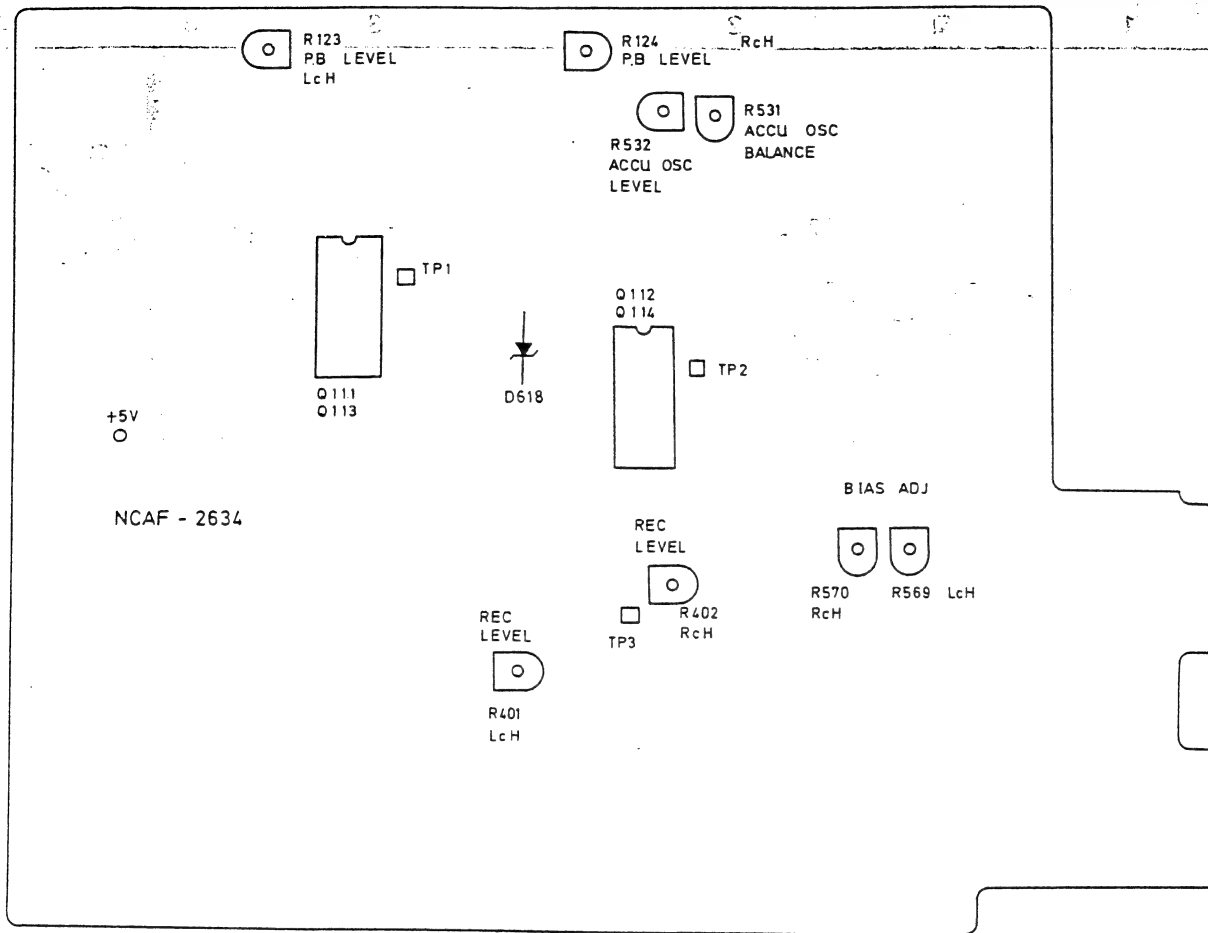
Confirming phase relationship

fig-1

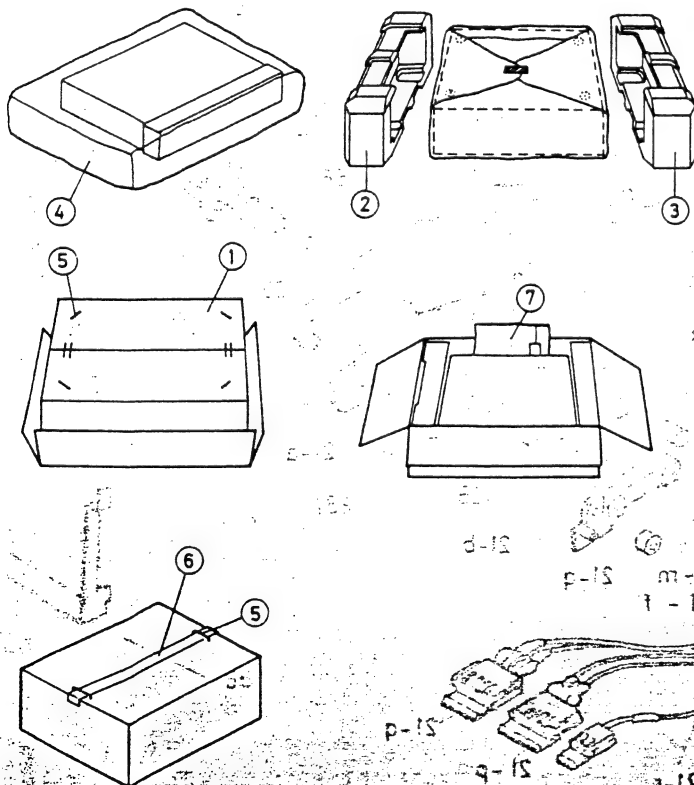
fig-2

PLAY torque 30 ~ 60 g/cm
FF, REW torque 70 ~ 140 g/cm

Back tension 4 ~ 7 g/cm



PACKING VIEW



REF. NO.	PART NO.	DESCRIPTION
1	29051303	Master carton box (S)
	29051305	Master carton box (B)
2	29090770A	Pad (L)
3	29090769B	Pad (R)
4	29100037A	650x500 Poly bag
	29095012-1	500x800 Protection sheet (B)
5	282301	Sealing hook
6	260012	Damplon tape
7		Accessory bag ass'y
	29341000B	Instruction manual
	2010095	Connection cable
	29365016B	Waranty card
	29100006A	350x250 Poly bag

NOTE

(S): Silver Model
(B): Black Model

PRINTED CIRCUIT BOARD PARTS LIST

Control pc board (NACOC-2637-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
	ICs	
Q701	222777	LM6402H-425
Q702	222776	LM6402H-424
Q703	222810	LC7800
Q704	222639 or	LB1275 or
	222865	BA12004
Q705	222840241	4024BP
Q706	222840692 or	4069BP or
	222934	BU4069UB
Q719, Q720	222953	MS4544AL
	Transistors	
Q707-Q709	2211454 or	2SA1015Y or
	2212494	JA101P
Q710, Q711,	2211255,	2SC1815GR,
Q715-Q717	2210746 or	2SC945AP or
	2212485	JC501Q
Q712, Q714	2211454 or	2SA1015Y or
	2212494	JA101P
Q713, Q718	2201540	2SD947
Q721	2201074 or	2SD880Y or
	2201385	2SD330E
Q727-Q733	2211454 or	2SA1015Y or
	2212494	JA101P
Q735-Q738	2211706	2SD655F
Q739	2211544	2SC1959Y
Q740, Q741	2211454 or	2SA1015Y or
	2212494	JA101P
Q744-Q746	2211255,	2SC1815GR,
	2210746 or	2SC945AP or
	2212485	JC501Q
	Diodes	
D701	223155	1SS138
D705-D707	223155	1SS138
D727	223155	1SS138
D725	2239593,	RD10EB3,
	2242885 or	EQA02-10B or
	2243213	MTZ10C
	Ceramic osc.	
X701	3010069	CSB800A
	Lamp	
PL902	210190	14V, 60mA
	Capacitors	
C701	354750479	4.7μF, 25V, Elect.
C702-C704	354780109	1μF, 50V, Elect.
C705	354784799	0.47μF, 50V, Elect.
C706	354741009	10μF, 16V, Elect.
C712	354732209	22μF, 10V, Elect.
C715	354734709	47μF, 10V, Elect.
C718	354781599	0.15μF, 50V, Elect.
C723-C725	354781099	0.1μF, 50V, Elect.
	Resistors	
R701-R711	49163392411	3.9kΩx11, 1/10W, Network
R713-R716	49163392404	3.9kΩx4, 1/10W, Network
R726-R731	49163392406	3.9kΩx6, 1/10W, Network
R732-R742	49163392411	3.9kΩx11, 1/10W, Network
R743-R746	49163392404	3.9kΩx4, 1/10W, Network
R785-R796	49163392412	3.9kΩx12, 1/10W, Network
R814-R817	49163392404	3.9kΩx4, 1/10W, Network
R763	441723904	39Ω, 2W, Oxidefilm
	Plug	
P603	25055132	NPLG-2P116
P604	25055133	NPLG-3P117
P605	25055135	NPLG-5P119

CIRCUIT NO.	PART NO.	DESCRIPTION
P701	25055140	NPLG-10P124
P702	2000548	NSAS-18P504, Mecha socket
P703	25055191	NPLG-10P-175
P704-P707	25055185	NPLG-4P-169
P708	25050290	NSCT-6P98, socket

Display pc board (NADIS-2638-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
	Diode	
D603, D604	223155	1SS138
	Leds	
D605, D610	225178	GL3HY28
D606, D710	225179	GL3NG28
D611, D612	225179	GL3NG28
D617, D709	225178	GL3HY28
D708, D712	225177	GL3PR28
D711	225178	GL3HY28
D713, D714	225178	GL3HY28
D718, D724	225179	GL2NG28
	Switch	
S601-S605	25035523	NPS-122-L485, Push
S710-S718	25035389	NPS-111-S353, Push
	Holder	
	27190448	Holder (LED-16)
	27190449	Holder (LED-4)

Operation switch pc board (NASW-2639-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
	Leds	
D715	225134	GL3WG1
D716, D717	225126	GL3PR1
	Switch	
S701-S709	25035389	NPS-111-S353, Push
	Socket	
P703A	2000400	NSAS-20P359
P704A	2000515	NSAS-8P471
	Holder	
	27190447	Holder (LED-3)

Remote control pc board (NARM-2640-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
P703	25050070	NSCT-7P20, Socket

Timer switch pc board (NASW-2641-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
S712	25030277A	NRS-225-20MP, Switch
P709	25050270	NSCT-6P98, Socket

Display pc board (NALED-2642-1)

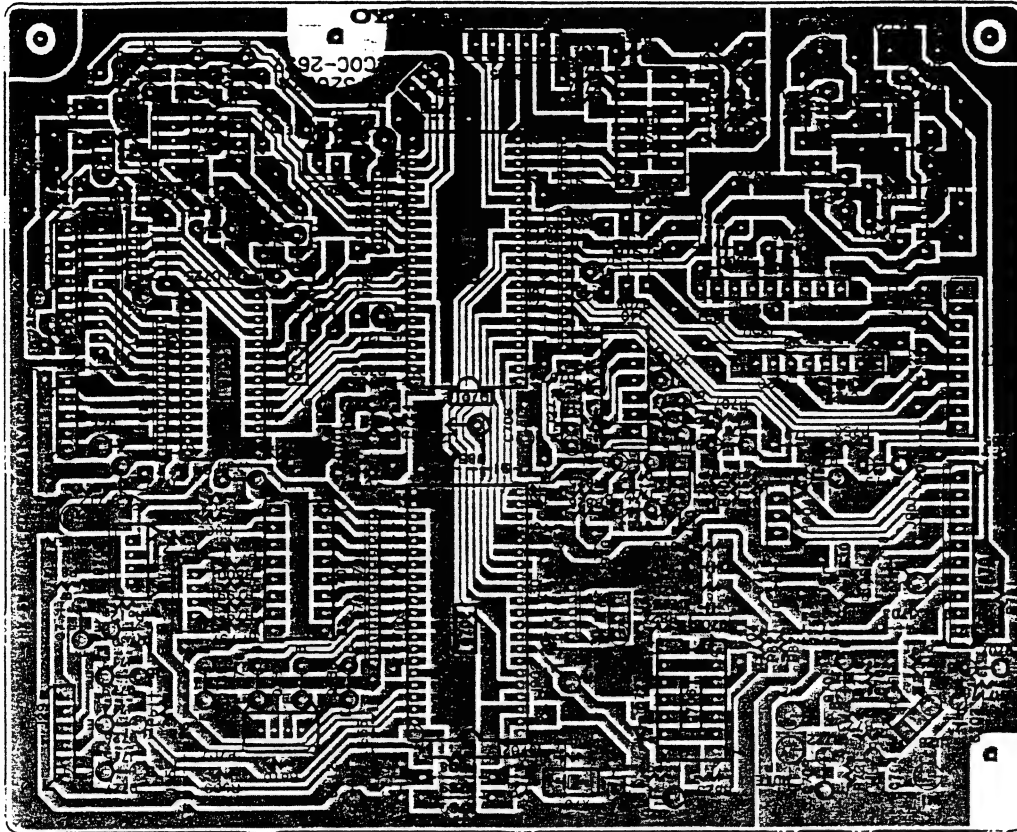
CIRCUIT NO.	PART NO.	DESCRIPTION
D726	225176	GL3N412, Led
P705A	2000570	NSAS-8P526, Socket
P706A	2000571	NSAS-8P527, Socket
P707A	2000572	NSAS-8P528, Socket

Power switch pc board (NAPS-2664-1)

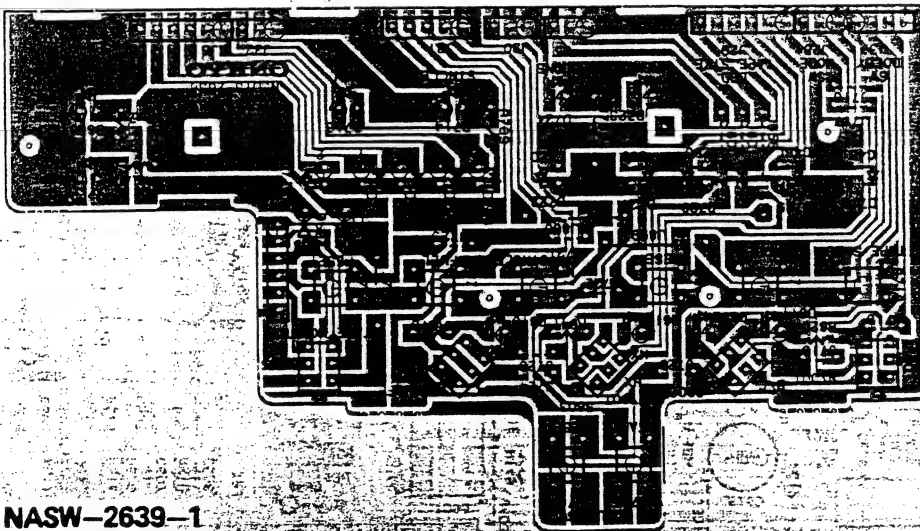
CIRCUIT NO.	PART NO.	DESCRIPTION
C901	3500065A	0.01μF, 400V, Capacitor IS
S901	25035375	NPS-111-L339P

PC BOARD VIEW FROM BOTTOM SIDE MOST VIEW GRAOB PC

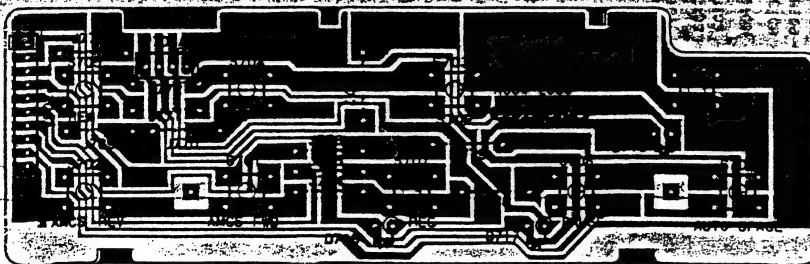
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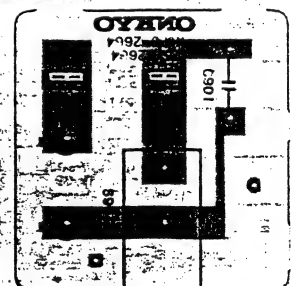
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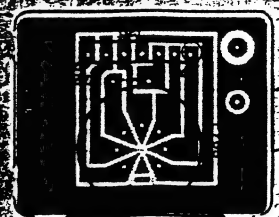
NASW-2639-1



NAPS-2664-1



NARM-2640-1



SCHEMATIC DIAGRAM-CONTROL SECTION

PRINTED CIRCUIT BOARD-PARTS LIST

Main circuit pc board (NAAF-2634-1A)

CIRCUIT NO.	PART NO.	DESCRIPTION	CIRCUIT NO.	PART NO.	DESCRIPTION
	ICs		Q608, Q609	2210746 or	2SC945AP or
Q107-Q110	222811 or	NJM4558DD or		2212485	JC501Q
	222502	NJM4558DX	Q904	2201074 or	2SD880Y or
Q111-Q114	222958	HA12090NT		2201385	2SD330E
Q125, Q126	222811 or	NJM4558DD or	Q905	2211255,	2SC1815GR,
	222502	NJM4558DX		2210746 or	2SC945AP or
Q301, Q302	222652	M5218L		2212485	JC501Q
Q403, Q404	222808	M5218P		Diodes	
Q409, Q410	222959	μPC1297CA	D101, D102	223155	1SS138
Q415	222918	BA6251	D301, D302	223132	1K60
Q501, Q502	222465,	NJM4558D,	D303, D304	223155	1SS138
	222808 or	M5218P or	D305, D306	223848	GP07B
	222921	BA4558	D307-D310	223155	1SS138
Q503, Q506,	222681 or	IR3702 or	D401-D407	223155	1SS138
Q510-Q517	222695	LA6324	D501-D504	223155	1SS138
Q601, Q602	222840661 or	4066BP	D505	2239472,	RD5.6EB2,
	222933	BU4066B		2243152 or	MTZ5.6B or
Q901	222780120	7812		2242824	EQA02-06A
Q902	222790122	79M12	D506	223150,	US1040,
Q903	222780050	7805		223124 or	1S2473 or
	Transistors			223145	1S2076TD
Q101-Q104	2211896 or	2SC1815LBL or	D507-D510	223132	1K60
	2211406	2SC2240BL	D511	223155	1SS138
Q105, Q106,	2211255,	2SC1815GR,	D512	2239451,	RD5.1EB1,
Q115, Q116	2210746 or	2SC945AP or		2242836 or	EQA02-05C or
	2212485	JC501Q		2243141	MTZ5.1A
Q117, Q118	2211706,	2SD655F,	D601	223132	1K60
	2211705,	2SD655E,	D602	223155	1SS138
	2212793,	2SD1468Q,	D607, D608	223155	1SS138
	2212794 or	2SD1468R,	D609	2239673,	RD15EB3,
	2212795	2SD1468S		2242722 or	EQA02-14B or
Q119, Q120	2212304,	2SK381D,		2243253	MTZ15C
	2212305,	2SK381E,	D613, D614	223150,	US1040,
	2211945 or	2SK246GR or		223124 or	1S2473 or
	2211946	2SK246BL		223145	1S2076TD
Q121-Q124	2211896 or	2SC1815BL or	D615, D616	223155	1SS138
	2211406	2SC2240BL	D901	223862 or	WL01 or
Q303, Q304,	2211255,	2SC1815GR,		223890	W01RL
Q401, Q402	2210746 or	2SC945AP or	D902	223868 or	2W02 or
	2212485	JC501Q		223889	RC202
Q405-Q408	2212304,	2SK381D,	D903	2239671,	RD15EB1,
	2212305,	2SK381E,		2242912 or	EQA-02-13B or
	2211945 or	2SK246GR or		2243251	MTZ15A
	2211946	2SK246BL	D904	223842 or	GP15B or
Q411	2211454 or	2SA1015Y or		223891	RL152
	2212494	JA101P	D905, D906	223155	1SS138
Q412	2211255,	2SC1815GR,		Coils	
	2210746 or	2SC945AP or	L101, L102	231099	NCH-6146
	2212485	JC501Q	L103, L104	233245	NCH-2029
Q413	2211454 or	2SA1015Y or	L105, L106	231077 or	NCH-2125 or
	2212494	JA101P		231025	NCH-1064
Q414	2201540	2SD947	L107, L108	231103	NMC-6149
Q507-Q509	2211255 or	2SC1815GR or	L109, L110	233245	NMC-2029
	2210746	2SC945AP	L111, L112	231077	NCH-2125
Q518, Q519	2211255,	2SC1815GR,		231025 or	NCH-1046 or
	2210746 or	2SC945AP or		233188	NCH-1033
	2212485	JC501Q	L401, L402	231089 or	NCH-2137 or
Q603, Q607,	2211454 or	2SA1015Y or		231044	NCH-2084
Q610-Q613	2212494	JA101P	L403-L406	231084 or	NCH-2132 or
Q604	2211255,	2SC1815GR,		231039	NCH-2079
	2210746 or	2SC945AP or	L407, L408	231101	NCH-2148
	2212485	JC501Q	L109, L110	231100	NCH-4147
Q605, Q606,	2211255,	2SC1815GR,	Z401	24606198	NOB-029

SCHEMATIC DIAGRAM-AMPLIFIER SECTION

CIRCUIT NO.	PART NO.	DESCRIPTION
Capacitors		
C101, C102	392880337	3.3 μ F, 50V, LL.
C107, C108	354741009	10 μ F, 16V, Elect.
C111, C112	354742209	22 μ F, 16V, Elect.
C119, C120	354783399	0.33 μ F, 50V, Elect.
C121, C122	354741009	10 μ F, 50V, Elect.
C125, C126	354780109	1 μ F, 50V, Elect.
C129, C130	354786899	0.68 μ F, 50V, Elect.
C131, C132	354780229	2.2 μ F, 50V, Elect.
C139, C140	354786899	0.68 μ F, 50V, Elect.
C141, C142	354780229	2.2 μ F, 50V, Elect.
C143, C144	354741009	10 μ F, 16V, Elect.
C145, C146	354780109	1 μ F, 50V, Elect.
C147, C148	354741009	10 μ F, 16V, Elect.
C149, C150	354741009	10 μ F, 16V, Elect.
C153, C154	354780109	1 μ F, 50V, Elect.
C157, C158	354786899	0.68 μ F, 50V, Elect.
C159, C160	354780229	2.2 μ F, 50V, Elect.
C167, C168	354786899	0.68 μ F, 50V, Elect.
C169, C170	354780229	2.2 μ F, 50V, Elect.
C171, C172	354741009	10 μ F, 16V, Elect.
C173-C176	354742219	220 μ F, 16V, Elect.
C177, C178	354780109	1 μ F, 50V, Elect.
C179, C180	354780109	1 μ F, 50V, Elect.
C181, C182	354783399	0.33 μ F, 50V, Elect.
C185, C186	354780109	1 μ F, 50V, Elect.
C301, C302	354741009	10 μ F, 16V, Elect.
C303, C304	354780339	3.3 μ F, 50V, Elect.
C401, C402	354741009	10 μ F, 16V, Elect.
C403, C404	354782299	0.22 μ F, 50V, Elect.
C405, C406	354750479	4.7 μ F, 25V, Elect.
C409, C410	354780339	3.3 μ F, 50V, Elect.
C431, C432	370131014	100PF, 100V, APS.
C433, C434	370134714	470PF, 100V, APS.
C438	354741009	10 μ F, 16V, Elect.
C439	354732219	220 μ F, 10V, Elect.
C501	354782299	0.22 μ F, 50V, Elect.
C503	354741009	10 μ F, 16V, Elect.
C504	354786899	0.68 μ F, 50V, Elect.
C508	354780339	3.3 μ F, 50V, Elect.
C509	354741009	10 μ F, 16V, Elect.
C513, C514	354741009	10 μ F, 16V, Elect.
C515	354750479	4.7 μ F, 25V, Elect.
C516	354741009	10 μ F, 16V, Elect.
C519	354780109	1 μ F, 50V, Elect.
C520	354742209	22 μ F, 16V, Elect.
C523	354741009	10 μ F, 16V, Elect.
C524	354742209	22 μ F, 16V, Elect.
C525	354782299	0.22 μ F, 50V, Elect.
C603, C604	354742209	22 μ F, 16V, Elect.
C605	354750479	4.7 μ F, 25V, Elect.
C606	354780109	1 μ F, 50V, Elect.
C904	354741009	10 μ F, 16V, Elect.
C905	352751029	1000 μ F, 25V, Elect.
C906	354752229	2200 μ F, 25V, Elect.
C907, C908	354783399	0.33 μ F, 50V, Elect.
C909, C910	354745709	47 μ F, 25V, Elect.
C911	352751029	1000 μ F, 25V, Elect.
C912	354752229	2200 μ F, 25V, Elect.
C913	354754709	47 μ F, 25V, Elect.
C914	3504168	13000 μ F, 25V, Elect.
C915	354783399	0.33 μ F, 50V, Elect.
C916	354782299	0.22 μ F, 50V, Elect.
C917	354754709	47 μ F, 25V, Elect.
C918	354754709	47 μ F, 25V, Elect.
C919, C920	354744719	470 μ F, 16V, Elect.

CIRCUIT NO.	PART NO.	DESCRIPTION
C922	354741009	10 μ F, 16V, Elect.
C923	354742219	220 μ F, 16V, Elect.
C924	354780109	1 μ F, 50V, Elect.
C925	354754709	47 μ F, 50V, Elect.
Resistors		
R123, R124	5215046	N08HR50KBC, Semi-fixed
R401, R402	5215044	N08HR5KBC, Semi-fixed
R531	5215047	N08HR100KBC, Semi-fixed
R532	5215018	N08HR1KBC, Semi-fixed
R569, R570	5215045	N08HR10BC, Semi-fixed
R199	5104184	N09RL1C250KWT20M, Variable
R901	441721004	10 Ω , 2W, Oxidefilm
R902	441524794	0.47 Ω , 1/2W, Oxidefilm
Plugs		
P101, P104	25055134	NPLG-4P118
P402	25055132	NPLG-2P116
Terminals		
P105	25045120	NPJ-3PDBL49
P103	25045195	HLJ-433B-01-3010
Socket		
P104	25050064	NSCT-5P18, DIN
P403	25050267	NSCT-3P95
P404	25050270	NSCT-6P98
P601	25050268	NSCT-4P96
P602	25050270	NSCT-6P98
P603	2000547	NSAS-4P503
P604	2000396	NSAS-6P355
P605	2000397	NSAS-10P356
Switch		
S501	25030277A	NRS-225-20MP, ACCU,
Screw		
	831430088	3TTW+8B (BC)
	82143010	3P+10FN (BC)
	223019	AC-229, TR specer
	223017	AC-310, Bushu
	27225077	Shield plate

Peak meter and volum pc board (NAVR-2635-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
IC		
Q305	222507	TA7612AP
LEDs		
D311, D312	225160	SEL9520BG
D313, D314	225161	SEL9520MB01
Lamp		
PL901	210090	14V, 150mA
Resistors		
R197, R198	6172001	N60LGL50KA5Z
	27225076	Shield plate

Headphone Terminal pc board (NAHP-2636-1)

CIRCUIT NO.	PART NO.	DESCRIPTION
P301	25045139	HLJ0540-01-010

NOTE

(S) - Silver model

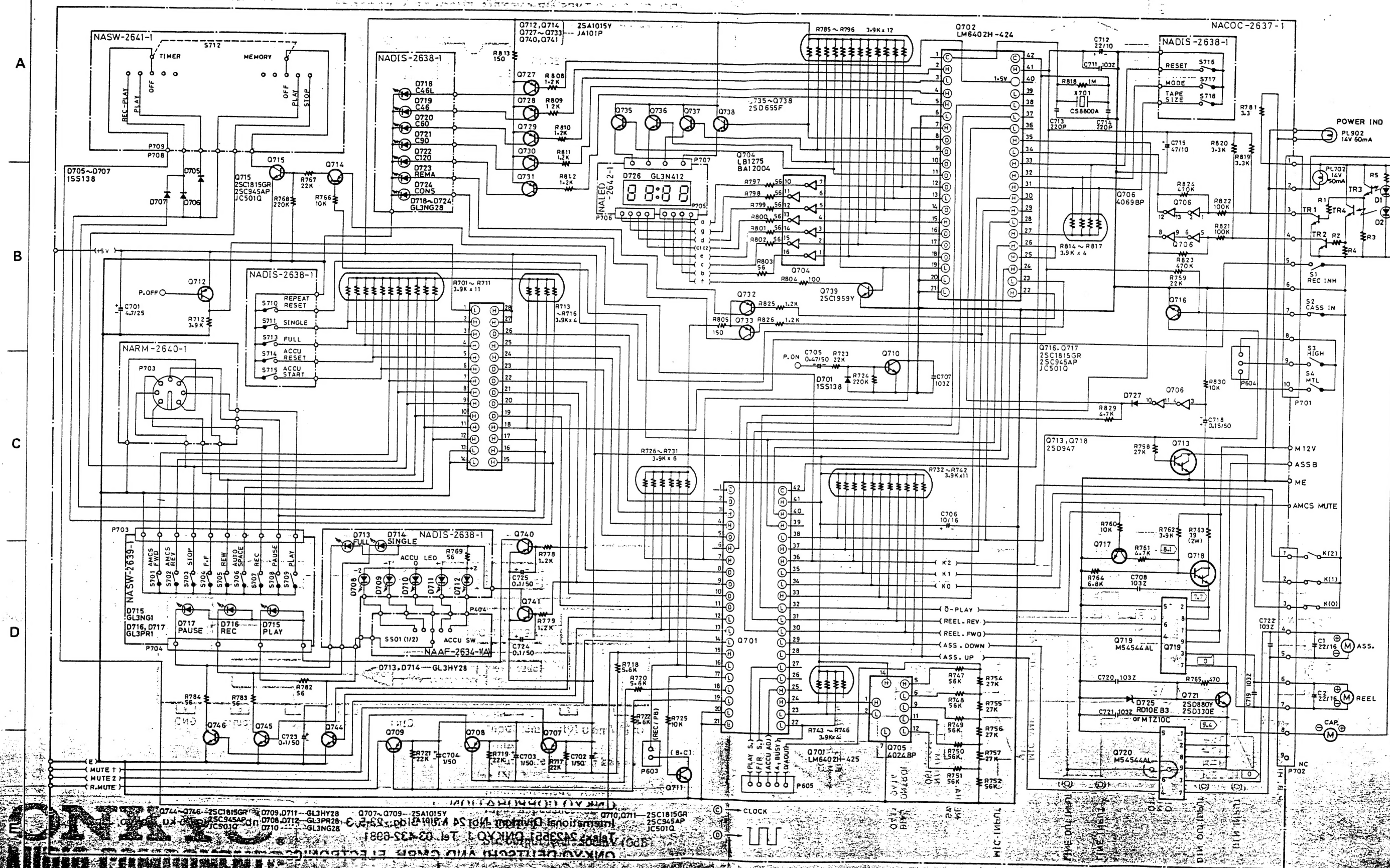
(B) - Black model

SCHEMATIC DIAGRAM-CONTROL SECTION

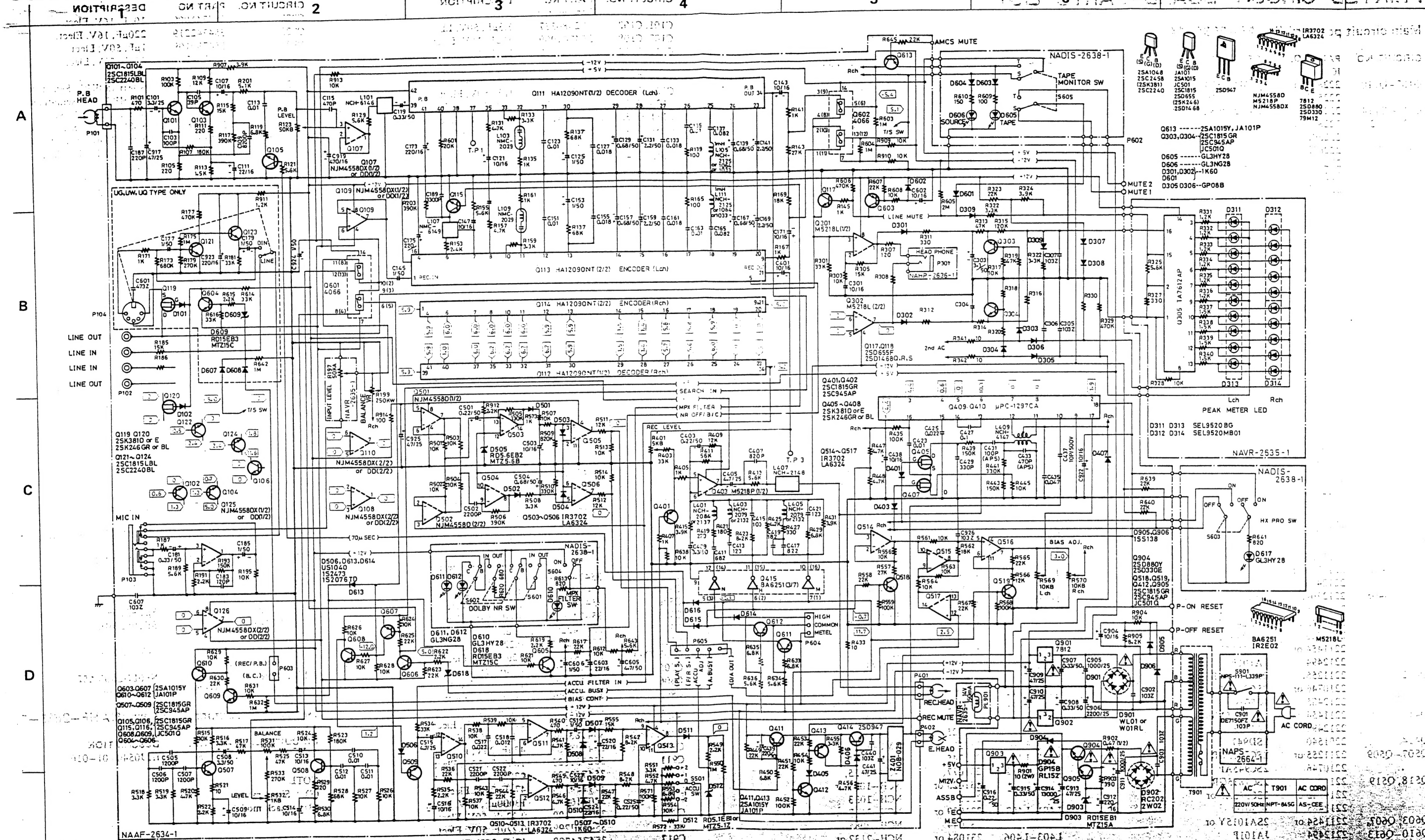
08388

TA2360

10 BLOCK DIAGRAM



SCHEMATIC DIAGRAM-AMPLIFIER SECTION

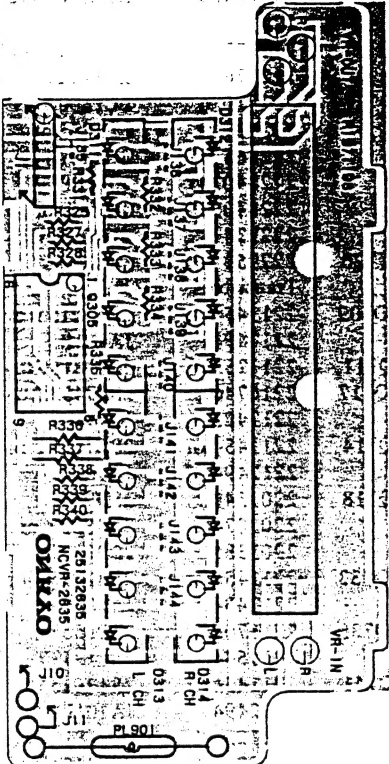
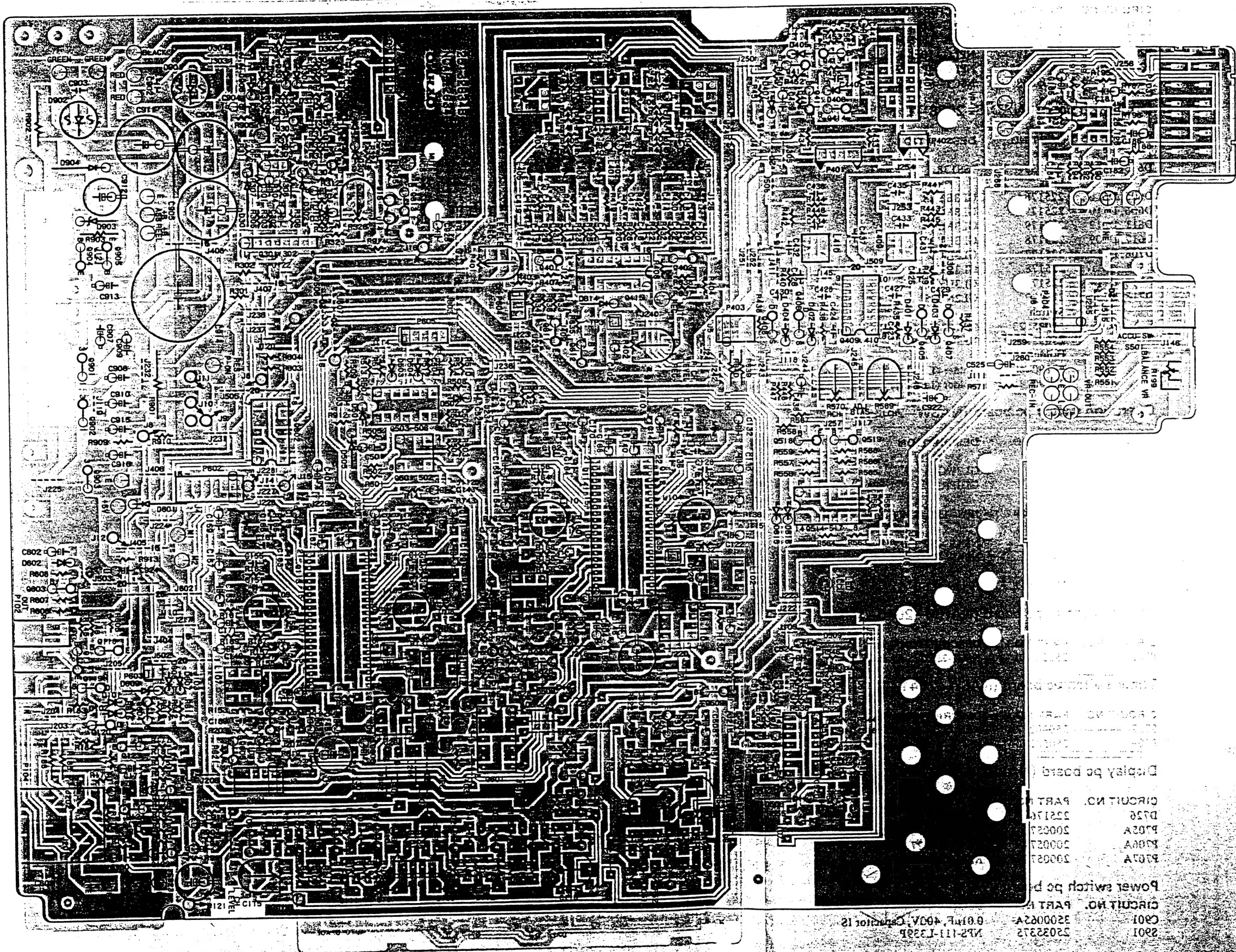


NOTES:
 ALL RESISTORS ARE IN OHMS, 1/4WATT OR 1/2WATT UNLESS OTHERWISE NOTED.
 ALL CAPACITORS ARE IN MF, 50V UNLESS OTHERWISE NOTED.
 ELECTROLYTIC CAPACITORS (E) ARE IN MF, 10V UNLESS OTHERWISE NOTED.
 ALL DIODES ARE 1N4148 UNLESS OTHERWISE NOTED.
 VOLTAGE MEASURED WITH V.T.V.M. (V) IS DC VOLTAGE (STOP MODE).
 THE COMPONENTS IDENTIFIED BY MARK ARE CRITICAL FOR SAFETY. REPLACE ONLY WITH PART NUMBER SPECIFIED.

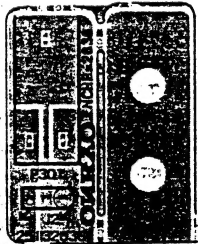
PC BOARD VIEW FROM BOTTOM SIDE

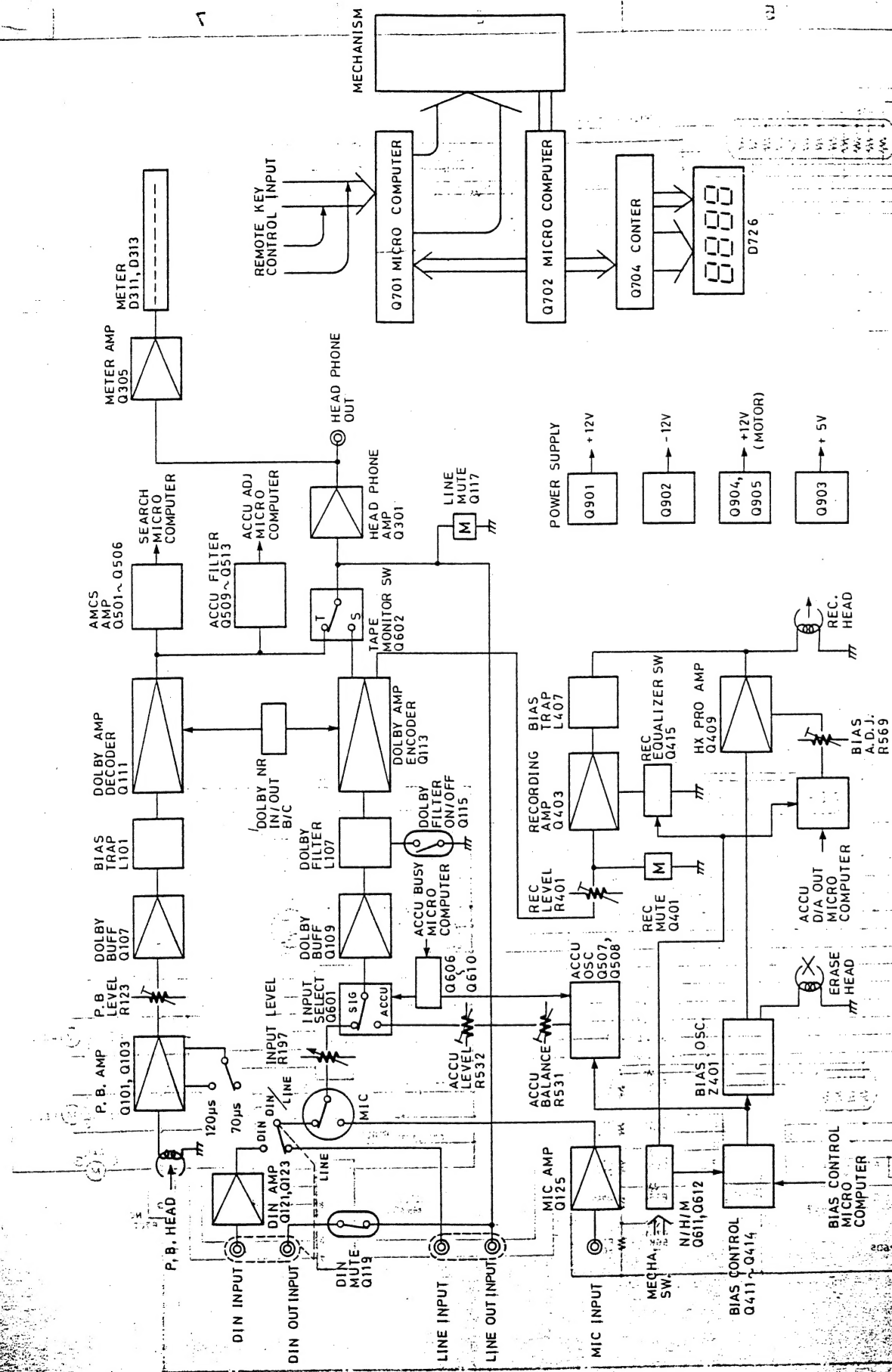
NAAF-2634-1A

NAVR-2635-1



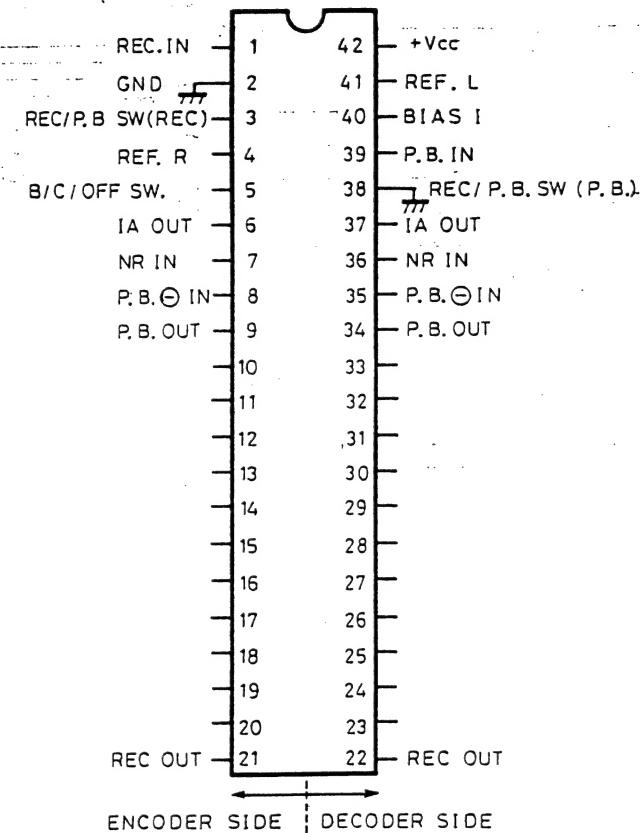
NAHP-2636-1



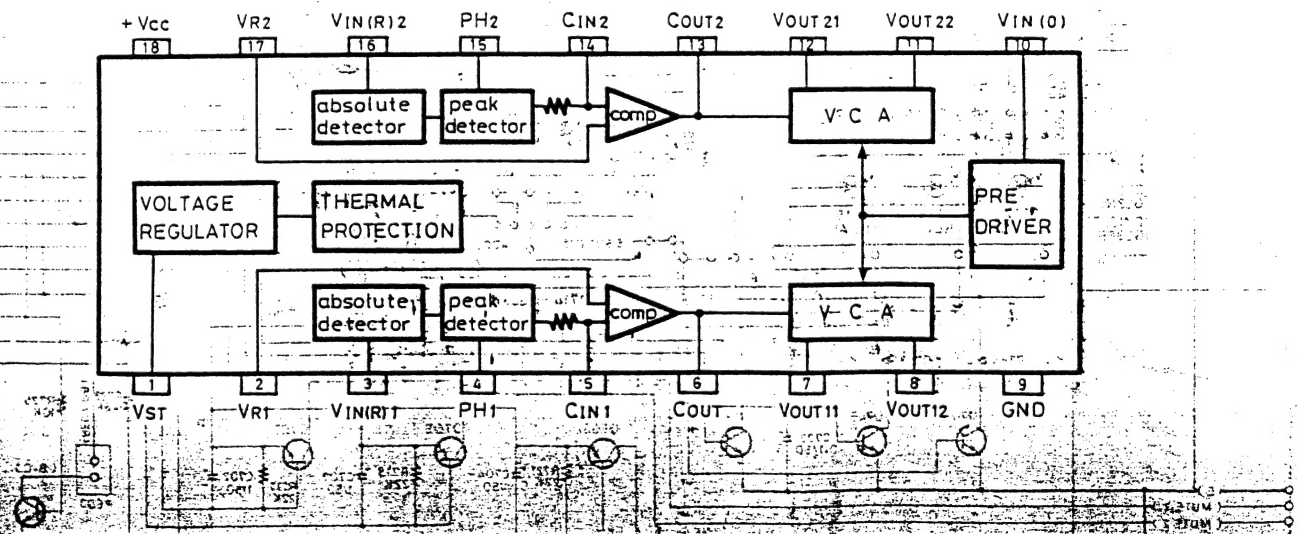


IC BLOCK DIAGRAM

HA-12090NT
(DOLBY B & C TYPE NR SYSTEM, ENCODER & DECODER
IN ONE PACKAGE)



μPC1297CA
(DOLBY HX PRO SYSTEM)



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